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Oct. 1892*

NEW CHAPTERS IN
THE WARFARE OF SCIENCE

BY
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METEOROLOGY

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NEW CHAPTERS IN

THE WARFARE OF SCIENCE.

METEOROLOGY.

THE popular beliefs of classic antiquity regarding storms, thunder, and lightning, took shape in myths representing Vulcan as forging thunderbolts, Jupiter as flinging them at his enemies, Æolus intrusting the winds in a bag to Æneas, and the like. An attempt at their further theological development is seen in the Pythagorean statement that lightnings are intended to terrify the damned in Tartarus.

But, at a very early period, we see the beginning of a scientific view. In Greece, the Ionic philosophers held that such phenomena are obedient to law; Plato, Aristotle, and many lesser lights, attempted to account for them on natural grounds; and their explanations, though crude, were based upon observation and thought. In Rome, Lucretius, Seneca, Pliny, and others, inadequate as their statements were, implanted at least the germs of a science. But, as the Christian Church rose to power, this evolution was checked; the new leaders of thought found, in the Scriptures recognized by them as sacred, the basis for a new view, or rather for a modification of the old view.

This ending of a scientific evolution based upon observation and reason, and this beginning of a sacred science based upon the letter of Scripture and on theology, are seen in the utterances of various Fathers in the early Church. As to the general features of this new development, Tertullian held that sundry passages of Scripture prove lightning identical with hell-fire;* and this idea was transmitted from generation to generation of later churchmen, who found an especial support of Tertullian's view in the sulphurous smell experienced during thunderstorms.† Saint Hilarion thought the firmament very much lower than the heavens, and that it was created for the support of the upper waters, as well as for the tempering of our atmosphere.‡ Saint Ambrose held

* See Tertullian, "Apol. contra gentes," c. 47.

† See, for example, Augustin de Angelis, "Lectiones Meteorologicae," 64.

‡ See Hilarion, "In Psalm. cxxxv" (Migne, "Patr. Lat.," ix, 773).

the firmament to be a solid vault, and the thunder to be caused by the winds breaking through it; citing from the prophet Amos the sublime passage regarding "Him that establisheth the thunders."* He shows, indeed, some conception of the true source of rain; but his whole reasoning is limited by various scriptural texts. He lays great stress upon the firmament as a solid outer shell of the universe: the heavens he holds to be not far outside this outer shell, and argues regarding their character, from St. Paul's Epistle to the Corinthians and from the one hundred and forty-eighth Psalm. As to "the waters which are above the firmament," he takes up the objection of those who hold that, this outside of the universe being spherical, the waters must slide off it, especially if the firmament revolves; and he points out that it is by no means certain that the *outside* of the firmament *is* spherical, and insists that, if it does revolve, the water is just what is needed to lubricate and cool its axis.†

Saint Jerome held that God at the creation spread out the firmament between heaven and earth, separating the upper waters from the lower, and that, in order to keep all in place, He caused the upper waters, to be frozen into ice. A proof of this view Jerome found in the words of Ezekiel regarding "the crystal stretched above the cherubim."‡

The germinal principle in accordance with which all these theories were evolved, was most clearly proclaimed to the world by Saint Augustine in his famous utterance, "Nothing is to be accepted save on the authority of Scripture, since greater is that authority than all the powers of the human mind."* No treatise was safe thereafter which did not breathe the spirit and conform to the letter of this maxim. Unfortunately, what was generally meant by the "authority of Scripture," was the tyranny of a literature imperfectly transcribed, viewed through distorting superstitions, and frequently interpreted by party spirit.

Following this precept, Saint Augustine developed, in every field, theological views of science which have never led to a single truth—which, without exception, have forced mankind away from the truth, and have caused Christendom to stumble for centuries into abysses of error and sorrow. In meteorology, as in every other science with which he dealt, he based everything upon the letter of the sacred text;

* "Firmans tonitrua" (Amos iv, 13); the phrase does not appear in our version.

† See Ambrose, "Hexameron," ii, 3, 4; iii, 5 (Migne, "Patr. Lat.," xiv, 148-150, 153, 165). The passage as to lubrication of the heavenly axis is as follows: "Deinde cum ipsi dicant volvi orbem cœli stellis ardentibus refulgentem, nonne divina providentia necessario prospexit, ut intra orbem cœli, et supra orbem redundaret aqua, quæ illa ferventis axis incendia temperaret?"

‡ See Jerome, "Epistola," lxi, 6 (Migne, "Patr. Lat.," xxii, 659).

* "Major est quippe Scripturæ hujus auctoritas, quam omnis humani ingenii capacitas."—Augustine, "De Genesi ad Lit.," ii, 5 (Migne, "Patr. Lat.," xxxiv, 266, 267). Or, as he is cited by Vincent of Beauvais ("Spec. Nat.," iv, 98): "Non est aliquid temere diffiniendum, sed quantum Scriptura dicit accipiendum, cujus major est auctoritas quam omnis humani ingenii capacitas."

and it is characteristic of the result that this man, so great when untrammelled, thought it his duty to guard especially the whole theory of the "waters above the heavens."

In the sixth century this theological reasoning was still further developed by Cosmas Indicopleustes. Basing his theory of the universe upon the ninth chapter of Hebrews, he insisted that the earth is flat, a parallelogram, and that from its outer edges rise immense walls supporting the firmament; then, throwing together the reference to the firmament in Genesis and the outburst of poetry in the Psalms regarding the "waters that be above the heavens," he insisted that over the terrestrial universe are solid arches bearing a vault, closing it in and supporting a vast cistern "containing the waters"; finally, taking from Genesis the expression regarding the "windows of heaven," he insisted that these windows are opened and closed by the angels whenever the Almighty wishes to send rain upon the earth or to withhold it.*

This was accepted by the universal Church as a vast contribution to thought; for over a thousand years it was the orthodox doctrine, and various leaders in theology devoted themselves to developing and supplementing it.

About the beginning of the seventh century, Isidore, Bishop of Seville, was the ablest prelate in Christendom, and was showing those great qualities which led to his enrollment among the saints of the Church. His theological view of science marks an epoch. As to the "waters above the firmament," Isidore contends that they must be lower than the uppermost heaven, though higher than the lower heaven, because in the one hundred and forty-eighth Psalm they are mentioned *after* the heavenly bodies and the "heaven of heavens," but *before* the terrestrial elements. As to their purpose, he hesitates between those who held that they were stored up there by the prescience of God for the destruction of the world at the flood, as the words of Scripture that "the windows of heaven were opened" seemed to indicate, and those who held that they were kept there to moderate the heat of the heavenly bodies. As to the firmament, he is in doubt whether it envelops the earth "like an egg-shell," or is merely spread over it "like a curtain"; for he holds that the passage in the one hundred and fourth Psalm may be used to support either view.

Having laid these scriptural foundations, Isidore shows considerable power of thought; indeed, at times, when he discusses the rainbow, rain, hail, snow, and frost, his theories are rational, and give evidence that, if he could have broken away from his adhesion to the letter of Scripture, he might have given a vast impulse to the evolution of a true science.†

* See Cosmas, "Topographia Christiana" (in Montfaucon, "Collectio nova patrum," ii).

† See Isidore, "Etymologiæ," xiii, 7-9, "De ordine creaturarum," 3, 4, and "De natura rerum," 29, 30 (Migne, "Patr. Lat.," lxxxii, 476, 477, lxxxiii, 920-922, 1001-1003).

About a century later appeared, at the other extremity of Europe, the second in the trio of theological men of science in the early middle ages, Bede the Venerable. The nucleus of his theory also is to be found in the accepted view of the "firmament" and of the "waters above the heavens," derived from Genesis; the firmament he holds to be spherical, and of a nature subtile and fiery; the upper heavens, he says, which contain the angels, God has tempered with ice, lest they inflame the lower elements; as to the waters placed above the firmament, lower than the spiritual heavens, but higher than all corporeal creatures, he says, "Some declare that they were stored there for the deluge, but others, more correctly, that they are intended to temper the fire of the stars." He goes on with long discussions as to various elements and forces in Nature, and dwells at length upon the air, of which he says that the upper, serene air is over the heavens; that the other, which is coarse with humid exhalations, is sent off from the earth, and that in this are lightning, hail, snow, ice, and tempests, finding proof of this in the one hundred and forty-eighth Psalm, where these are commanded to "praise the Lord from the earth."*

So great was Bede's authority that nearly all the anonymous speculations of the next following centuries upon these subjects were eventually ascribed to him. In one of these spurious treatises an attempt is made to get new light upon the sources of the waters above the heavens, the main reliance being the sheet containing the animals let down from heaven, in the vision of Saint Peter. Another of these treatises is still more curious, for it endeavors to account for earthquakes and tides by means of the Leviathan mentioned in Scripture. This characteristic passage runs as follows: "Some say that the earth contains the animal Leviathan, and that he holds his tail after a fashion of his own, so that it is sometimes scorched by the sun, whereupon he strives to get hold of the sun, and so the earth is shaken by the motion of his indignation; he drinks in also, at times, such huge masses of the waves that when he belches them forth all the seas feel their effect."† (And this theological theory of the tides, as caused by the alternate suction and belching of Leviathan, went far and wide.)

In the writings thus covered with the name of Bede, there is much showing a scientific spirit, which might have come to something of permanent value had it not been hampered by the supposed necessity of conforming to the letter of Scripture. It is as startling as it is refreshing to hear one of these mediæval theorists burst out against those who are content to explain everything by the power of God, as follows: "What is more pitiable than to say that a thing *is*, because God is able to do it, and not to show any reason why it is so, nor any purpose for which it is so; just as if God did everything that he is

* See Bede, "De natura rerum" (Migne, "Patr. Lat.," xc).

† See the treatise "De mundi constitutione," in Bede's "Opera" (Migne, "Patr. Lat.," xc, 884).

able to do! You talk like one who says that God is able to make a calf out of a log. But *did* he ever do it? Either, then, show a reason why a thing is so, or a purpose wherefore it is so, or else cease to declare it so.*

The most permanent contribution of Bede to scientific thought in this field was his revival of the view that the firmament is made of ice; and he supported this from the words in the twenty-sixth chapter of Job, "He bindeth up the waters in his thick cloud, and the cloud is not rent under them."

About the beginning of the ninth century appeared the third in that triumvirate of churchmen who were the oracles of sacred science throughout the early middle ages—Rabanus Maurus, Abbot of Fulda and Archbishop of Mayence. Starting, like all his predecessors, from the first chapter of Genesis, borrowing here and there from the ancient philosophers, and excluding everything that could conflict with the letter of Scripture, he follows, in his work upon the universe, his two predecessors, Isidore and Bede, developing especially Bede's theory that the firmament is strong enough to hold up the "waters above the heavens," because it was made of ice.†

For centuries the authority of these three great teachers was unquestioned, and in countless manuals and catechisms their doctrine was translated and diluted for the common mind.‡ But, about the second quarter of the twelfth century, a priest, Honorius of Autun, produced several treatises which show that thought on this subject had made some little progress. He explained the rain rationally, and mainly in the modern manner; with the thunder he is less successful, but insists that the thunderbolt "is not stone, as some assert." His thinking is vigorous and independent.* Had theorists such as he been many, a new science could have been rapidly evolved, but the theological current was too strong.

The strength of this current which overwhelmed the thought of Honorius is seen again in the work of the Dominican monk, John of San Geminiano, who in the thirteenth century gave forth his "Summa

* See "Elementa philosophiæ," in Bede's "Opera" (Migne, "Patr. Lat.," xc, 1139). This treatise, which has also been printed, under the title of "De philosophia mundi," among the works of Honorius of Autun, is believed by modern scholars (Hauréau, Werner, Poole) to be the production of William of Conches.

† See Rabanus Maurus, "Comment. in Genesim" and "De Universo" (Migne, "Patr. Lat.," cvii, cxi).

‡ For a charmingly naïve example of these primers, see the little Anglo-Saxon manual of astronomy, sometimes attributed to Ælfric. It is in the vernacular, but is translated in Wright's "Popular Treatises on Science during the Middle Ages." Bede is, of course, its chief source.

* See Honorius Augustodunensis, "De imagine mundi," and "Hexæmeron" (Migne, "Patr. Lat.," clxxii). The "De philosophia mundi," the most rational of all, is, however, believed by modern scholars to be unjustly ascribed to him. See note above.

de Exemplis" for the use of preachers in his order. Of its thousand pages, over two hundred are devoted to illustrations drawn from the heavens and the elements. A characteristic specimen is his explanation of the Psalmist's phrase, "The arrows of the thunder." These, he tells us, are forged out of a dry vapor rising from the earth and kindled by the heat of the upper air, which then, coming into contact with a cloud just turning into rain, "is conglutinated like flour into dough," but, being too hot to be extinguished, its particles become merely sharpened at the lower end, and so blazing arrows, cleaving and burning everything they touch."*

But far more important in the thirteenth century was the fact that the most eminent scientific authority of that age, Albert the Great, Bishop of Ratisbon, attempted to reconcile the speculations of Aristotle with the theological views derived from the fathers. In one very important respect he improved upon the meteorological views of his great master. The thunderbolt, he says, is no mere fire, but the product of black clouds containing much mud, which, when it is baked by the intense heat, forms a fiery black or red stone that falls from the sky, tearing beams and crushing walls in its course: such he has seen with his own eyes.†

The monkish encyclopedists of the later middle ages added little to these theories. As we glance over the pages of Vincent of Beauvais, Bartholomew of Glanville, and William of Conches, we note only a growing deference to the authority of Aristotle as supplementing that of Isidore and Bede and explaining sacred Scripture. Aristotle is treated like a church Father, but extreme care is taken not to go beyond the great maxim of Saint Augustine; then, little by little, Bede and Isidore fall into the background, Aristotle fills the whole horizon, and his utterances are second in sacredness only to the text of Holy Writ.

A curious illustration of the difficulties these mediæval scholars had to meet in reconciling the scientific theories of Aristotle with the letter of the Bible is seen in the case of the rainbow. It is to the honor of Aristotle that his conclusions regarding the rainbow, though slightly erroneous, were based upon careful observation and evolved by reasoning alone; but his Christian commentators, while anxious to follow him, were brought up against the scriptural statement that God had created the rainbow as a sign to Noah that there should never again be a Flood on the earth. Even so bold a thinker as Cardinal Pierre d'Ailly, whose speculations as to the geography of the earth did so much afterward in stimulating Columbus, faltered before this statement, acknowledging that God alone could explain it; but sug-

* See Joannes à S. Geminiano, "Summa," c. 75.

† See Albertus Magnus, "II Sent.," Opp. xv, 137, a. (cited by Heller, "Gesch. d. Physik," i, 184) and his "Liber Methaurorum," III, iv, 18 (of which I have used the edition of Venice, 1488).

gested that possibly never before the deluge had a cloud been suffered to take such a position toward the sun as to cause a rainbow.*

The learned cardinal was also constrained to believe that certain stars and constellations have something to do in causing the rain, since these would best explain Noah's foreknowledge of the Deluge. In connection with this scriptural doctrine of winds came a scriptural doctrine of earthquakes: they were believed to be caused by winds issuing from the earth, and this view was based upon the passage in the one hundred and thirty-fifth Psalm, "He bringeth the wind out of his treasures."†

Such were the main typical attempts during nearly fourteen centuries to build up under theological guidance and within scriptural limitations a sacred science of meteorology. But these theories were mainly evolved in the effort to establish a basis and general theory of phenomena: it still remained to account for special manifestations, and here came a development of theological thought far more important.

This development was twofold: on the one hand, these phenomena were attributed to the Almighty; and, on the other, to Satan. As to the first of these theories, we constantly find the divine wrath mentioned by the earlier fathers as the cause of lightning, hail-storms, hurricanes, and the like.

At the very beginning of Christianity we see a curious struggle between pagan and Christian belief upon this point. Near the close of the second century the Emperor Marcus Aurelius, in his effort to save the empire, fought a hotly-contested battle with the Quadi, in what is now Hungary. While the issue of this great battle was yet doubtful, there came suddenly a blinding storm beating into the faces of the Quadi. This gave the Roman troops the advantage, and enabled Marcus Aurelius to win a decisive victory. Votaries of each of the great religions claimed that this storm was caused by the object of their own adoration. The pagans insisted that Jupiter had sent the storm in obedience to their prayers, and on the Antonine Column at Rome we may still see the figure of Olympian Jove casting his thunderbolts and pouring a storm of rain from the open heavens against the Quadi. On the other hand, the Christians insisted that the storm had been sent by Jehovah in obedience to *their* prayers; and Tertullian, Eusebius, Saint Gregory of Nyssa, and Saint Jerome were among those who insisted upon this meteorological miracle—the first two, indeed, in the fervor of their arguments for its reality,

* See his "Concordia astronomicae veritatis cum theologia" (Paris, 1483) in his "Imago mundi"—and Venice, 1490); also Eck's commentary on Aristotle's "Meteorologica" (Augsburg, 1519).

† See Reisch, "Margarita philosophica," ix, 18, and Eck, "Arist. Meteor." (as above), ii, nota 2.

allowing themselves to be carried considerably beyond exact historical truth.*

As time went on, the Fathers developed this view more and more from various texts in the Jewish and Christian sacred books, substituting for Jupiter flinging his thunderbolts the Almighty wrapped in thunder and sending forth his lightnings. Through the middle ages this was fostered until it became a mere truism, entering into all mediæval thinking, and was still further developed by an attempt to specify the particular sins which were thus punished. In the twelfth century the Florentine historian, Villani, ascribed floods and fires to the "too great pride of the city of Florence and the ingratitude of the citizens toward God," which, "of course," says a recent historian, "meant their insufficient attention to the ceremonies of religion."†

In the thirteenth century the Cistercian monk, Cæsar of Heisterbach, popularized the doctrine in Central Europe. His rich collection of anecdotes for the illustration of religious truths was the favorite recreative reading in the convents for three centuries, and exercised great influence over the thought of the later middle ages; and in this work he relates several instances of the divine use of lightning, both for rescue and for punishment. Thus he tells us how the steward (*cellerarius*) of his own monastery was saved from the clutch of a robber by a clap of thunder which, in answer to his prayer, burst suddenly from the sky and frightened the bandit from his purpose; how, in a Saxon theatre, twenty men were struck down, while a priest escaped, not because he was not a greater sinner than the rest, but because the thunderbolt had respect for his profession! It is Cæsar, too, who tells us the story of the priest of Treves, struck by lightning in his own church, whither he had gone to ring the bell against the storm, and whose sins were revealed by the course of the lightning; for it tore his clothes from him and consumed certain parts of his body, showing that the sins for which he was punished were vanity and unchastity.‡

This mode of explaining the divine interference more minutely is developed century after century, and we find both Catholics and Protestants assigning as causes of unpleasant meteorological phenomena whatever appears to them wicked, or even unorthodox. Among the English reformers, Tyndale quotes in this kind of argument the thirteenth chapter of I. Samuel, showing that, when God gave Israel a king, it thundered and rained.* Archbishop Whitgift, Bishop Bale,

* For the authorities, pagan and Christian, see the note of Merivale, in his "History of the Romans under the Empire," chap. lxxiii. He refers, for still fuller citations, to Fynes Clinton's "Fast. Rom.," p. 24.

† See Trollope, "History of Florence," i, 64.

‡ See Cæsar, *Heisterbacensis*, "Dialogus miraculorum," x, c. 28-30.

* See Tyndale, "Doctrinal Treatises," 194 (in Parker Society publications).

and Bishop Pilkington insisted on the same view.* In Protestant Germany, about the same period, Plieninger took a dislike to the new Gregorian calendar, and published a volume of "Brief Reflections," in which he insisted that the elements had given utterance to God's anger against it, calling attention to the fact that violent storms raged over almost all Germany during the very ten days which the Pope had taken out for the correction of the year, and that great floods began with the first days of the corrected year.†

Early in the seventeenth century, Majoli, Bishop of Voltoraria, in southern Italy, produced his huge work, "*Dies Canicularii*," or "Dog-Days," which remained a favorite encyclopædia in Catholic lands for over a hundred years. Treating of thunder and lightning, he compares them to bombs against the wicked, and says that the thunderbolt is "an exhalation condensed and cooked into stone," and that "it is not to be doubted that, of all instruments of God's vengeance, the thunderbolt is the chief"; that by means of it Sennacherib and his army were consumed; that Luther was struck by lightning in his youth as a caution against departing from the Catholic faith; that blasphemy and Sabbath-breaking are the sins to which this punishment is especially assigned, and he cites the case of Dathan and Abiram.‡ Fifty years later the Jesuit Stengel developed this line of thought still further in four thick quarto volumes on the judgments of God, adding an elaborate schedule for the use of preachers in the sermons of an entire year. Three chapters were devoted to thunder, lightning, and storms. That the author teaches the agency in these of diabolical powers goes without saying; but this can only act, he declares, by divine permission, and the thunderbolt is always the finger of God, which rarely strikes a man save for his sins, and the nature of the special sin thus punished may be inferred from the bodily organs smitten.* A few years later, in Protestant Swabia, Pastor George Nuber issued a whole volume of "weather-sermons," in which he discusses nearly every sort of elemental disturbances—storms, floods, droughts, lightning, and hail. These, he says, come direct from God for human sins, yet no doubt with discrimination, for there are five sins which God especially punishes with lightning and hail, namely, impenitence, incredulity, neglect of the repair of churches, fraudulence in the payment of tithes to the clergy, and oppression of subordinates, each of which points he supports with a mass of scriptural texts.¶

* See Whitgift, "Works," 477-483; Bale, "Works," 244, 245; and Pilkington, "Works," 177, 536 (both in Parker Society publications). Bishop Bale cites especially Job xxxviii, Ecclesiasticus xiii, and Revelation viii, as supporting the theory.

† See Janssen, "Geschichte des deutschen Volkes," v, 350, for Plieninger's words.

‡ See Majoli, "*Dies Can.*," I, i.

* See Stengelius, "*De judiciis divinis*," ii, 15-61, and especially the example of the "*impurus et saltator sacerdos, fulmine castratus*" (pp. 26, 27).

¶ See Nuber, "*Conciones meteoricæ*" (Ulm, 1661).

This doctrine having become especially precious both to Catholics and to Protestants, there were issued hand-books of prayers against bad weather: among these was the "Spiritual Thunder and Storm Booklet," produced in 1731 by a Protestant scholar, Stöltzlin, whose three or four hundred pages of prayer and song, "sighs for use when it lightens fearfully," and "cries of anguish when the hail-storm is drawing on," show a wonderful adaptability to all possible meteorological emergencies. The preface of this volume is contributed by Professor Dilherr, pastor of the great church of St. Sebald at Nuremberg, who, in discussing the divine purposes of storms, adds to the three usually assigned—namely, God's wish to manifest his power, to display his anger, and to drive sinners to repentance—a fourth, which, he says, is that God may show us "with what sort of a storm-bell he will one day ring in the last judgment." *

About the end of the first quarter of the eighteenth century, we find, in Switzerland, even the eminent and rational Professor of Mathematics, Scheuchzer, publishing a "Physica Sacra," with the Bible as a basis, and forced to admit that the elements, in the most literal sense, utter the voice of God. The same pressure was felt in New England. Typical are the sermons of Increase Mather on "The Voice of God in Stormy Winds." He especially lays stress on the voice of God speaking to Job out of the whirlwind, and upon the text, "Wind and storm fulfilling his word." He declares, "When there are great tempests, the angels oftentimes have a hand therein, . . . yea, and sometimes evil angels." He gives several cases of blasphemers struck by lightning, and says, "Nothing can be more dangerous for mortals than to condemn dreadful providences, and, in particular, dreadful tempests." †

His distinguished son, Cotton Mather, disentangled himself somewhat from the old view, as he had done in the interpretation of comets. ‡ In his "Christian Philosopher," his "Thoughts for the Day of Rain," and his "Sermon preached at the Time of the Late Storm" (in 1723), he is evidently tending toward the modern view. Yet, from time to time, the older view has reasserted itself; and in France, as recently as the year 1870, we find the Bishop of Verdun ascribing the drought afflicting his diocese to the sin of Sabbath-breaking.*

This theory, which attributed injurious meteorological phenomena

* See Stöltzlin, "Geistliches Donner- und Wetter-Büchlein" (Zürich, 1731).

† See Increase Mather, "The Voice of God," etc. (Boston, 1704). This rare volume is in the rich collection of the American Antiquarian Society at Worcester.

‡ See a chapter on this subject, by the present writer, in "The Popular Science Monthly" for October, 1885. A new edition, with large additions, has been recently published by the American Historical Association.

* See the "Semaine relig. de Lorraine," 1870, p. 445 (cited by "Paul Parfait," in his "Dossier des Pèlerinages," 141-143).

mainly to the purposes of God, was a natural development, and comparatively harmless ; but at a very early period there was evolved another theory, which, having been ripened into a doctrine, cost the earth dear indeed. Never, perhaps, in the modern world has there been a dogma more prolific of physical, mental, and moral agony throughout whole nations and during whole centuries. This theory, its development by theology, its fearful results to mankind, and its destruction by scientific observation and thought, will form the subject of the remainder of this chapter.

While the Fathers and school-men were laboring to deduce a science of meteorology from our sacred books, there oozed up in European society a mass of traditions and observances which had been lurking since the days of paganism ; and, although here and there appeared a churchman to oppose them, the theologians and ecclesiastics ere long began to adopt them and to clothe them with the authority of religion.

Both among the pagans of the Roman Empire and among the barbarians of the North the Christian missionaries had found it easier to prove the new God supreme than to prove the old gods powerless. Faith in the miracles of the new religion seemed to increase rather than to diminish faith in the miracles of the old ; and the Church at last began admitting the latter as facts, but ascribing them to the devil. Jupiter and Odin sank into the category of ministers of Satan, and transferred to that master all their former powers. A renewed study of Scripture by the theologians, in the light of this hypothesis, elicited overwhelming proofs of its truth. They found very many sacred texts to support it, and it soon became a dogma. So strong was the hold it took, under the influence of the Church, that not until late in the seventeenth century did its substantial truth begin to be questioned.

Now, with no field of action had the sway of the ancient deities been more identified than with that of atmospheric phenomena. The Roman heard Jupiter, and the Teuton heard Thor, in the thunder. Could it be doubted that these powerful beings would now take occasion, unless hindered by the command of the Almighty, to vent their spite against those who had deserted their altars ? Might not the Almighty himself be willing to employ the malice of these powers of the air against those who had offended him ?

It was, indeed, no great step, for those whose simple faith accepted rain or sunshine as an answer to their prayers, to suspect that the untimely storms or droughts, which baffled their most earnest petitions, were the work of the arch-enemy, "the Prince of the power of the air."

The great Fathers of the Church had laid the basis of this doctrine in Scripture. Saint Jerome declared the air to be full of devils, basing this belief upon various statements in the prophecies of Isaiah and in

the Epistle to the Ephesians.* Saint Augustine held the same view as beyond controversy.†

During the middle ages this doctrine of the diabolical origin of storms went on gathering strength. Bede had full faith in it, and narrates various anecdotes in support of it.‡ Saint Thomas Aquinas gave it his sanction, saying in his all-authoritative "Summa": "Rains and winds, and whatsoever occurs by local impulse alone, can be caused by demons." "It is," he says, "a dogma of faith that the demons can produce wind, storms, and rain of fire from heaven."*

Albert the Great taught the same doctrine, and showed how a certain salve thrown into a spring produced whirlwinds.¶ The great Franciscan—the "seraphic doctor"—Saint Bonaventura, whose services to theology earned him one of the highest places in the Church, and to whom Dante gave special honor in paradise, set upon this belief his high authority.[^] The lives of the saints, and the chronicles of the middle ages, were filled with it. Poetry and painting accepted the idea and developed it. Dante wedded it to verse,§ and at Venice this thought may still be seen embodied in one of the grand pictures of Bordone: a ship-load of demons is seen approaching Venice in a storm, threatening destruction to the city, but Saint Mark, Saint George, and Saint Nicholas attack the vessel, and disperse the hellish crew.‡

The popes again and again sanctioned this doctrine, and it was amalgamated with various local superstitions, pious imaginations, and interesting arguments, to strike the fancy of the people at large. A strong argument in favor of a diabolical origin of the thunderbolt was afforded by the eccentricities of its operation. These attracted especial attention in the middle ages, and the popular love of marvel generalized isolated phenomena into rules. Thus, it was said that the lightning strikes the sword in the sheath, gold in the purse, the foot in the shoe, leaving sheath, and purse, and shoe unharmed; that it consumes a human being internally without injuring the skin; that it destroys

* Thus, in his "Com. in Epist. ad Ephesios" (iii, 6), commenting on the text, "Our battle is not with flesh and blood," he explains this as meaning the devils in the air; and adds: "Nam et in alio loco de dæmonibus quod in aere isto vagentur, Apostolus ait: In quibus ambulastis aliquando juxta sæculum mundi istius, secundum principem potestatis aeris spiritus, qui nunc operatur in filios diffidentiae" (Ephes. ii, 2). "Hæc autem omnium doctorum opinio est, quod aer iste qui coelum et terram medius dividens, inane appellatur, plenus sit contrariis fortitudinibus." See also his "Com. in Isaiam," xiii, 50 (Migne, "Patr. Lat.," xxiv, 477).

† As to Augustine, see the "De Civitate Dei," *passim*.

‡ See Bede, "Hist. Eccles.," i, 17; "Vita Cuthberti," c. 17.

* See Thomas Aquinas, "Summa," pars I, qu. lxxx, art. 2, cited by Maury, "Légendes Pieuses," 11 (who, however, borrowed this phraseology, not from the text, but from the index). The second citation I owe to Rydberg, "Magic of the Middle Ages," 73, where the whole interesting passage is given at length.

¶ See Albertus Magnus, "De Potentia Dæmonum" (cited by Maury, as above).

[^] See Bonaventura, "Comp. Theol. Veritat.," ii, 26.

§ See Dante, "Purgatorio," c. 5.

‡ See Maury, "Légendes Pieuses," 18, note.

nets in the water, but not on the land ; that it kills one man, and leaves untouched another standing beside him ; that it can tear through a house and enter the earth without moving a stone from its place ; that it injures the heart of a tree, but not the bark ; that wine is poisoned by it, while poisons struck by it lose their venom ; that a man's hair may be consumed by it, and the man be unhurt.*

These peculiar phenomena, made much of by the allegorizing sermonizers of the day, were used in moral lessons from every pulpit. Thus, the Carmelite, Matthias Farinator, of Vienna, who at the pope's own instance compiled early in the fifteenth century that curious handbook of illustrative examples for preachers, the "*Lumen Animæ*," finds a spiritual analogue for each of these anomalies.†

This doctrine grew robust and noxious, until, in the fifteenth, sixteenth, and seventeenth centuries, we find its bloom in a multitude of treatises by the most learned of the Catholic and Protestant divines, and its fruitage in the torture-chambers and on the scaffolds throughout Christendom. At the Reformation period, and for nearly two hundred years afterward, Catholics and Protestants vied with each other in promoting this growth. John Eck, the great opponent of Luther, gave to the world an annotated edition of Aristotle's "*Physics*," which was long authoritative in the German universities ; and, though the text is free from this doctrine, the woodcut illustrating the earth's atmosphere shows most vividly, among the clouds of mid-air, the devils who there reign supreme.‡

Luther, in the other religious camp, supported the superstition even more zealously, asserting at times his belief that the winds themselves are only good or evil spirits,* and declaring that a stone thrown into a certain pond in his native region would cause a dreadful storm because of the devils kept prisoners there.||

Just at the close of the same century, Catholics and Protestants hailed alike the great work of Delrio.^A In this the power of devils over the elements is proved first from the Holy Scriptures, since, he declares, "they show that Satan brought fire down from heaven to consume the servants and flocks of Job, and that he stirred up a violent wind, which overwhelmed in ruin the sons and daughters of Job at their feasting" ; next, Delrio insists on the agreement of all the orthodox Fathers that it was the devil himself who did this, and attention is called to the fact that the hail with which the Egyptians were punished is expressly declared in Holy Scripture to have been brought

* See, for lists of such *admiranda*, any of the early writers—e. g., Vincent of Beauvais, Reisch's "*Margarita*," or Eck's "*Aristotle*."

† See the "*Lumen Animæ*," Eichstadt, 1479.

‡ See Eck, "*Aristotelis Meteorologica*," Augsburg, 1519.

* "*Table Talk*."

|| See Michelet, "*Life of Luther*," (translated by Hazlitt, p. 321).

^A His "*Disquisitiones Magicæ*," first printed at Liège in 1599-1600 (in three vols. 4to), but reprinted again and again throughout the seventeenth century.

by the evil angels.* Citing from the Apocalypse, he points to the four angels standing at the four corners of the earth, holding back the winds and preventing their doing great damage to mortals; † and he dwells especially upon the fact that the devil is called by the apostle a "Prince of the power of the air." ‡ He then goes on to cite the great Fathers of the Church, Clement, Jerome, Augustine, and Thomas Aquinas. #

This doctrine was spread, not only in ponderous treatises, but in light literature, and by popular illustrations. In the "Compendium Maleficarum" of the Italian monk Guacci, perhaps the most amusing book in the whole literature of witchcraft, we may see the witch, *in propria persona*, riding the diabolic goat through the clouds while the storm rages around and beneath her; and we may read a rich collection of anecdotes, largely contemporary, which establish the required doctrine beyond question. ||

The first and most natural means taken against this work of Satan in the air, was Prayer; and various petitions are to be found scattered through the Christian liturgies—some very beautiful and touching. This means of escape has been relied upon, with greater or less faith, from those days to these. Various mediæval saints and reformers, and devoted men in all centuries, from Saint Giles to John Wesley, have used it with results claimed to be miraculous. ^ Whatever theory any thinking man may hold in the matter, he will certainly not venture a reproachful word: such prayers have been in all ages a natural outcome of the mind of man in trouble.

But against the "powers of the air" were used other means of a very different character and tendency, and foremost among these was Exorcism. In an exorcism widely used and ascribed to Pope Gregory XIII, the formula is given: "I, a priest of Christ, . . . do command ye, most foul spirits, who do stir up these clouds, . . . that ye depart from them, and disperse yourselves into wild and untilled places, that ye may be no longer able to harm men or animals or fruits or herbs or whatsoever is designed for human use." But this is mild, indeed, compared to some later exorcisms, as when the ritual runs: "All the people shall rise, and the priest, turning toward the clouds, shall pronounce these words: 'I exorcise ye, accursed demons, who have dared to use, for the accomplishment of your iniquity, those powers of Nature

* This interpretation of Psalm lxxviii, 47-49, was apparently shared by the translators of our own authorized version.

† Revelation, vii, 1.

‡ Ephesians, ii, 2. Even according to modern commentators (e. g. Alford) the word here translated "power" denotes, not *might*, but *government, court, hierarchy*; and in this sense it was always used by the ecclesiastical writers, whose conception is best rendered by our plural—"powers."

* See Delrio, "Disquisitiones Magicæ," lib. ii, c. 11.

|| See Guacci, "Compendium Maleficarum" (Milan, 1606).

^ For the cases of Saint Giles, John Wesley, and others stilling the tempests, see Brewer, "Dictionary of Miracles," s. v. "Prayer."

by which God in divers ways worketh good to mortals ; who stir up winds, gather vapors, form clouds, and condense them into hail. . . . I exorcise ye, . . . that ye relinquish the work ye have begun, dissolve the hail, scatter the clouds, disperse the vapors, and restrain the winds.' " The rubric goes on to order that then there shall be a great fire kindled in an open place, and that over it the sign of the cross shall be made, and the one hundred and fourteenth Psalm chanted, while malodorous substances, among them sulphur and asafœtida, shall be cast into the flames. The purpose seems to have been literally to "smoke out" Satan.*

Manuals of exorcisms became important—some bulky quartos, others hand-books. Noteworthy among the latter is one by the Italian priest Locatelli, entitled "Exorcisms most Powerful and Efficacious for the Dispelling of Aërial Tempests, whether raised by Demons at their own Instance or at the Beck of some Servant of the Devil." †

The Jesuit Gretser, in his famous book on "Benedictions and Maledictions," devotes a chapter to this subject, dismisses summarily the skepticism that questions the power of devils over the elements, and adduces the story of Job as conclusive. ‡

Nor was this theory of exorcism by any means confined to the elder Church. Luther vehemently upheld it, and prescribed especially the first chapter of St. John's gospel as of unfailing efficacy against thunder and lightning, declaring that he had often found the mere sign of the cross, with the text, "The word was made flesh," sufficient to put storms to flight.*

From the beginning of the middle ages until long after the Reformation, the chronicles give ample illustration of the successful use of such exorcisms. So strong was the belief in them that it forced itself into minds comparatively rational, and found utterance in treatises of much importance.

But, since exorcisms were found at times ineffectual, other means were sought, and especially Fetiches of various sorts. One of the earliest of these appeared when Pope Alexander I, in the second century, ordained that holy-water should be kept in churches and bedchambers to drive away devils. || Another safeguard was found in relics, and

* See Polidorus Valerius, "Practica exorcistarum"; also the "Thesaurus exorcismorum" (Cologne, 1626), 158-162.

† That is, "Exorcismi," etc. A "corrected" second edition was printed at Laybach, 1680, in 24mo, to which is appended another manual of "Preces et conjurationes contra aëreas tempestates, omnibus sacerdotibus utiles et necessaria," printed at the monastery of Kempten (in Bavaria) in 1667. The latter bears as epigraph the passage from the gospels describing Christ's stilling of the winds.

‡ See Gretser, "De benedictionibus et maledictionibus," lib. ii, c. 48.

* So, at least, says Gretser (in his "De ben. et mal.," as above).

|| "Instituit ut aqua quam sanctam appellamus sale admixta interpositis sacris orationibus et in templis et in cubiculis ad fugandos dæmones retineretur."—Platina, "Vitæ Pontif.," s. v. Alexander (108-117 A. D.).

of similar efficacy were the so-called "conception billets" sold by the Carmelite monks. They contained a formula upon consecrated paper, at which the devil might well turn pale. Buried in the corner of a field, one of these was thought to give protection against bad weather and destructive insects.*

But highest in repute during centuries was the *Agnus Dei*—a piece of wax blessed by the pope's own hand, and stamped with the well-known device representing the "Lamb of God."† Its powers were so marvelous that Pope Urban V thought three of them a fitting gift from himself to the Greek emperor. In the Latin doggerel recounting their virtues, their meteorological efficacy stands first, for especial stress is laid on their power of dispelling the thunder. This stress thus laid by Pope Urban, as the infallible guide of Christendom, on the efficacy of this fetich, gave it great value throughout Europe, and the doggerel verses reciting its virtues sank deep into the popular mind.‡ It was considered a most potent means of dispelling hail, pestilence, storms, conflagrations, and enchantments; and this feeling was deepened by the rules and rites for its consecration.* So solemn was the matter, that the manufacture and sale of this particular fetich was, by a papal bull of 1471, reserved for the pope himself,|| and he only performed the required ceremony in the first and seventh years of his pontificate. Standing unmitred, he prayed: "O God, . . . we humbly beseech thee that thou wilt bless these waxen forms, figured with the image of an innocent lamb, . . . that, at the touch and sight of them, the faithful may break forth into praises, and that the crash of hailstorms, the blast of hurricanes, the violence of tempests, the fury of winds, and the malice of thunderbolts may be tempered, and evil spirits flee and tremble before the standard of thy holy cross, which is graven upon them."△

* See Rydberg, "The Magic of the Middle Ages," translated by Edgren, pp. 64–66.

† They are still in use in the Church, and may be found described in any ecclesiastical cyclopædia.

‡ "Tonitrua magna terret,
Et peccata nostra delet;
Ab incendio præservat,
A submersione servat,
A morte cita liberat,
Et Cacodæmones fugat,

Inimicos nostros domat,
Prægnantem cum partu salvat,
Dona dignis multa confert,
Utque malis mala defert.
Portio, quamvis parva sit,
Ut magna tamen proficit."

See these verses cited in full faith, so late as 1743, in Father Vincent of Berg's "Enchiridium," pp. 23, 24, where is a full account of the virtues of the *Agnus Dei*, and instructions for its use.

* A full account of these rites, with the consecrating prayers and benedictions which gave color to this theory of the powers of the *Agnus Dei*, may be found in the ritual of the Church. I have used the edition entitled "Sacrarum ceremoniarum sive rituum Sanctæ Romanæ Ecclesiæ libri tres," Rome, 1560, in folio.

|| See Rydberg, "Magic of the Middle Ages," p. 63.

△ "Deus, . . . te suppliciter deprecamur, ut . . . has cereas formas, innocentissimi agni imagine figuratas, benedicere . . . digneris, ut per ejus tactum et visum fideles in-

Another favorite means with the clergy of the older Church, for bringing to naught the powers of the air, was found in great Processions, bearing statues, relics, and holy emblems through the streets.* Yet, even these were not always immediately effective. One at Liège, in the thirteenth century, thrice proved unsuccessful in bringing rain, when at last it was found that the image of the Virgin had been forgotten! A new procession was at once formed, the *Salve Regina* sung, and the rain came down in such torrents as to drive the devotees to shelter.†

In Catholic lands this custom remains to this day, and very important features in these processions are the statues and reliquaries of patron saints. Some of these excel in bringing sunshine, others in bringing rain. The Cathedral of Chartres is so fortunate as to possess sundry relics of Saint Taurin, especially potent against dry weather, and some of Saint Piat, very nearly as infallible against wet weather.‡ In certain regions a single saint gives protection alternately against wet and dry weather—as, for example, Saint Godeberte at Noyon.* Against storms Saint Barbara is very generally considered the most powerful protectress; but, in the French diocese of Limoges, Notre Dame de Crocq has proved a most powerful rival, for when, a few years since, all the neighboring parishes were ravaged by storms, not a hailstone fell in the canton which she protected. In the diocese of Tarbes, Saint Exupère is especially invoked against hail, peasants flocking from all the surrounding country to his shrine.||

But the means of baffling the powers of the air which came to be most widely used was the ringing of consecrated Church-Bells.

This usage had begun in the time of Charlemagne, and there is extant a prohibition of his against the custom of baptizing bells and of hanging certain tags^A on their tongues as a protection against hailstorms; but even Charlemagne was powerless against this current of mediæval superstition. Theological reasons were soon poured into it, and, about the year 970, Pope John XIII is said to have baptized a bell in the Lateran, christening it with his own name, to have stood sponsor

vitentur ad laudes, fragor grandinum, procella turbinum, impetus tempestatum, ventorum rabies, infesta tonitrua temperentur, fugiant atque tremiscant maligni spiritus ante Sanctæ Crucis vexillum, quod in illis exsculptum est. . . ." ("Sacr. Cer. Rom. Eccl.," as above.) If any are curious as to the extent to which this consecrated wax was a specific for all spiritual and most temporal ills during the sixteenth and seventeenth centuries, let them consult the Jesuit "*Litteræ annuæ*," *passim*.

* John of Winterthur describes many such in Switzerland in the thirteenth century, and all the monkish chronicles speak of them.

† See Rydberg, "*Magic of the Middle Ages*," p. 74.

‡ See the "*Guide du touriste et du pèlerin à Chartres*," 1867 (cited by "Paul Parfait," in his "*Dossier des Pèlerinages*").

* See "Paul Parfait," as above, p. 139.

|| See "Paul Parfait," as above, p. 145.

^A "*Perticæ*." See Montanus, "*Hist. Nachricht von den Glocken*" (Chemnitz, 1726), p. 121; and Meyer, "*Der Aberglaube des Mittelalters*," p. 186.

for one of the bells of St. Peter's, and to have issued a bull for the baptizing of bells "to cleanse the air of devils."*

This idea was rapidly developed, and we soon find it supported in ponderous treatises, spread widely in sermons, and popularized in multitudes of inscriptions cast upon the bells themselves. This branch of theological literature may still be studied in multitudes of church-towers throughout Europe. A bell at Basel bears the inscription, "Ad fugandos demones." Another, in Lugano, declares "The sound of this bell vanquishes tempests, repels demons, and summons men." Another, at the Cathedral of Erfurt, declares that it can "ward off lightning and malignant demons."† A peal in the Jesuit church at the university town of Pont-à-Mousson bore the words, "They praise God, put to flight the clouds, affright the demons, and call the people." This is dated 1634. Another bell in that part of France declares, "It is I who dissipate the thunders" (*Ego sum qui dissipō tonitrua*).‡

Another, in one of the forest cantons of Switzerland, bears a doggerel couplet, which may be thus translated :

"On the devil my spite I'll vent,
And, God helping, bad weather prevent."*

Very common were inscriptions embodying this doctrine in sonorous Latin.

In accordance with this doctrine, there grew up a ritual for the consecration of bells. Knollys, in his quaint translation of the old chronicler Sleidan, gives us the usage in the simple English of the middle of the sixteenth century :

"In lyke sorte [as churches] are the belles used. And first, forsouth, they must hange so, as the Byshop may goe round about them. Whiche after he hath sayde certen Psalmes, he consecrateth water and salte, and minglet them together, wherwith he washeth the belle diligently both within and without, after wypeth it drie, and with holy oyle draweth in it the signe of the crosse, and prayeth God, that whan they shall ryng or sounde that bell, all the disceiptes of the devyll may vanyshe away, hayle, thondryng, lightening, wyndes, and tempestes, and all untemperate weathers may be aswaged. Whan he hath wipte out the crosse of oyle wyth a linen cloth, he maketh seven other crosses in the same, and within one only. After saying certen Psalmes, he taketh a payre of sensours and senseth the bel within, and

* Such is the current statement (see, e. g., Higgins's "Anacalypsis," ii, 70), but I am unable to find satisfactory record of this bull. Platina relates only ("Vitæ Pontif." s. v. John XIII) that this pope stood sponsor for a bell of St. Peter's.

† These illustrations, with others equally striking, may be found in Meyer, "Der Aberglaube des Mittelalters," 185, 186.

‡ For these two instances and many more, see Germain, "Anciennes cloches lorraines" (Nancy, 1885), pp. 23, 27.

* "An dem Tüfel will ich mich rächen,
Mit der hilf gotz alle bösen wetter zerbrechen."

(See Meyer, as above.)

prayeth God to sende it good lucke. In many places they make a great dyner, and kepe a feast as it were at a solemne wedding."*

These bell baptisms became matters of great importance. Popes, kings, and prelates were proud to stand as sponsors. During the French Revolution, four of the bells at the Cathedral of Versailles were destroyed; and on the 6th of January, 1824, four new ones were baptized, the Voltairian King, Louis XVIII, and the pious Duchess d'Angoulême standing as sponsors.

In some of these ceremonies, zeal appears to have outrun knowledge, and one of Luther's stories, at the expense of the older Church, was that certain authorities thus christened a bell "Hosanna," supposing that to be the name of a woman.

To add to the efficacy of such baptisms, water was sometimes brought from the river Jordan.†

The prayers used at bell baptisms fully recognize this doctrine; the ritual of Paris embraces the petition that "whensoever this bell shall sound, it shall drive away the malign influences of the assailing spirits, the horror of their apparitions, the rush of whirlwinds, the stroke of lightning, the harm of thunder, the disasters of storms, and all the spirits of the tempest."‡ Another prayer begs that "the sound of this bell may put to flight the fiery darts of the enemy of men";* and others vary the form but not the substance of this petition. The great Jesuit theologian, Bellarmin, did indeed try to deny the reality of this baptism; but this can only be regarded as a piece of casuistry suited to Protestant hardness of heart, or as strategy in the warfare against heretics.

Forms of baptism were laid down in various manuals sanctioned directly by papal authority, and sacramental efficacy was everywhere taken for granted.‖ The development of this idea in the older Church was too strong to be resisted;^ but, as a rule, the Protestant theo-

* Sleidan's "Commentaries," English translation, as above, fol. 384 (lib. xxi, sub anno 1549).

† See Montanus, as above, who cites Beck, "Lutherthum vor Luther," p. 294, for the statement that many bells were carried to the Jordan by pilgrims for this purpose.

‡ See Arago, "Œuvres" (Paris, 1854), vol. iv, p. 322.

* Arago, as above.

| As has often been pointed out, the ceremony was in all its details—even to the sponsors, the wrapping a garment about the baptized, the baptismal fee, the feast—precisely the same as when a child was baptized. Magius, who is no skeptic, relates, from his own experience, an instance of this sort, where a certain bishop stood sponsor for two bells, giving them both his own name—William (see his "De Tintinnabulis," xiv).

^ And no wonder, when the oracle of the Church, Thomas Aquinas, expressly pronounced church-bells, "provided they have been duly consecrated and baptized," the foremost means of "frustrating the atmospheric mischiefs of the devil," and likened steeples in which bells are ringing to a hen brooding her chickens, "for the tones of the consecrated metal repel the demons and avert storm and lightning"; when pre-Reformation preachers of such universal currency as Joannes Herolt could declare, "Bells, as all agree, are baptized with the result that they are secure from the power of Satan,

gians of the Reformation, while admitting that storms were caused by Satan and his legions, opposed the baptism of bells, and denied the theory of their influence in dispersing storms.* Luther, while never doubting that troublesome meteorological phenomena were caused by devils, regarded with contempt the idea that the demons were so childish as to be scared by the clang of bells; his theory of diabolic power made them altogether too powerful to be affected by means so trivial. The great English reformers, while also accepting very generally the theory of diabolic interference in storms, reproved strongly the baptizing of bells, as the perversion of a sacrament, and involving blasphemy. Bishop Hooper declared reliance upon bells to drive away tempests, futile; † Bishop Pilkington, while arguing that tempests are direct instruments of God's wrath, is very severe against using "unlawful means," and among these he names "the hallowed bell"; ‡ and these opinions were very generally shared by the leading English clergy. *

Toward the end of the sixteenth century the Elector of Saxony strictly forbade the ringing of bells against storms, urging penance and prayer instead; § but the custom was not so easily driven out of the Protestant Church, and in some quarters was developed a Protestant theory of a rationalistic sort—ascribing the good effects of bell-ringing in storms to the calling together of the devout for prayer or to the suggestion of prayers during storms at night. ^ As late as the end of the seventeenth century we find the bells of Protestant churches in Northern Germany rung for the dispelling of tempests. ¶ In Catholic Austria this bell-ringing seems to have become a nuisance in the last century, for the Emperor Joseph II found it necessary to issue an edict against it; but this doctrine had gained too large headway to be arrested by argument or edict, and the bells may be heard ringing during storms to this day in various remote districts in Europe.

For this was no mere superficial view. It was really part of a deep

terrify the demons, compel the powers"; and when a canonist like Durandus explained the purpose of the rite to be, that "the demons hearing the trumpets of the Eternal King, to wit, the bells, may flee in terror, and may cease from the stirring up of tempests." (See Herolt, "Sermones Discipuli," xvii, and Durandus, "De ritibus ecclesiæ," ii, 12.) (I owe the first of these citations to Rydberg, and the others to Montanus.)

* The baptism of bells was, indeed, one of the express complaints of the German Protestant princes at the Reformation. See their "Gravam. Cent. German. Grav.," 51.

† See his "Early Writings," 197 (in "Parker Society Publications").

‡ See his "Works," 177 (in "Parker Society Publications").

* E. g., by Tyndale, Bishop Ridley, Archbishop Sandys, Becon, Calphill, Rogers. It is to be noted that all these speak of the rite as "baptism."

§ See Peuchen, "Disp. circa tempestates," Jena, 1697.

^ See, e. g., the "Conciones Selectæ" of Superintendent Conrad Dieterich (cited by Peuchen, "Disp. circa tempestates").

¶ See Schwimmer, "Physicalische Luftfragen," 1692 (cited by Peuchen, as above). He pictures the whole population of a Thuringian district flocking to the churches on the approach of a storm.

theological current steadily developed through the middle ages, the fundamental idea of the whole being the evident influence of the bells upon the "power of the air"; and it is perhaps worth our while to go back a little and glance over the growth of this deeper current in modern times. Having grown steadily through the middle ages, it appeared in full strength at the Reformation period; and in the sixteenth century Olaus Magnus, Archbishop of Upsala and Primate of Sweden, in his great work on the northern nations, declares it a well-established fact that cities and harvests may be saved from lightning by the ringing of bells and the burning of consecrated incense, accompanied by prayers; and he cautions his readers that the workings of the thunderbolt are rather to be marveled at than inquired into.* Even as late as 1673 the Franciscan professor Lealus, in Italy, in a school-book which was received with great applause in his region, taught unhesitatingly the agency of demons in storms, and the power of bells over them, as well as the portentousness of comets and the movement of the heavens by angels. He dwells especially, too, upon the perfect protection afforded by the waxen *Agnus Dei*. How strong this current was, and how difficult even for philosophical minds to oppose, is shown by the fact that both Descartes† and Francis Bacon‡ speak of it with respect, admitting the fact, and suggesting very mildly that the bells may accomplish this purpose by the concussion of the air.

But no such moderate doctrine sufficed, and the renowned Bishop Binsfeld, of Treves, in his great treatise on the credibility of the confessions of witches, gave an entire chapter to the effect of bells in calming atmospheric disturbances. Basing his general doctrine upon the first chapter of Job and the second chapter of Ephesians, he insisted on the reality of diabolic agency in storms; and then, by theological reasoning, corroborated by the statements extorted in the torture-chamber, he showed the efficacy of bells in putting the hellish legions to flight.* This continued, therefore, an accepted tenet, developed in every nation, and coming to its climax near the end of the seventeenth century. At that period—the period of Isaac Newton—Father Augustine de Angelis, rector of the Clementine College at Rome, published under the highest church authority his lectures upon meteorology. Coming from the center of Catholic Christendom, at so late a period, they are very important as indicating what had been developed under the influence of theology during nearly seventeen hundred years. This learned head of a great college at the heart of Christendom taught that "the surest remedy against thunder is that

* See Olaus Magnus, "De gentibus septentrionalibus" (Rome, 1555), lib. i, c. 12, 13.

† See his "De meteor.," c. 7.

‡ See his "Natural History," ii, cent. 2, 127. In his "Historia Ventorum" he again alludes to the belief, and without comment.

* See Binsfeld, "De Confessionibus Malef." (pp. 308–314, of edition of 1623).

which our Holy Mother the Church practices, namely, the ringing of bells when a thunderbolt impends : thence follows a twofold effect, physical and moral—a physical, because the sound variously disturbs and agitates the air, and by agitation disperses the hot exhalations and dispels the thunder ; but the moral effect is the more certain, because by the sound the faithful are stirred to pour forth their prayers, by which they win from God the turning away of the thunderbolt.”* Here we see in this branch of thought, as in so many others, at the close of the seventeenth century, the dawn of rationalism. Father De Angelis now keeps demoniacal influence in the background. Little, indeed, is said of the efficiency of bells in putting to flight the legions of Satan : the wise professor is evidently preparing for that inevitable compromise which we see in the history of every science when it is clear that it can no longer be suppressed by ecclesiastical fulminations.

But, while this apparently harmless doctrine regarding modes of dealing with the powers of the air was developed, there were evolved another theory and a series of practices sanctioned by the Church, which must forever be considered as among the fearful calamities in human history. Indeed, few errors have ever cost so much shedding of innocent blood over such wide territory and during so many generations. Out of the old doctrine—pagan and Christian—of evil agency in atmospheric phenomena, was evolved the belief that certain men, women, and children had secured infernal aid to produce whirlwinds, frosts, floods, and the like.

As early as the ninth century one great churchman, Agobard, Archbishop of Lyons, struck a heavy blow at this superstition. His work, “Against the Absurd Opinion of the Vulgar touching Hail and Thunder,” shows him to have been one of the most devoted apostles of right reason whom human history has known. By argument and ridicule, and at times by a lofty eloquence, he attempted to breast this tide. One passage is of historical significance. He declares : “The wretched world lies now under the tyranny of foolishness ; things are believed by Christians of such absurdity as no one ever could aforetime induce the heathen to believe.”†

All in vain ; the tide of superstition continued to roll on ; great theologians developed it and ecclesiastics favored it ; until as we near the end of the mediæval period the infallible voice of Rome is heard accepting it, and clinching this belief into the mind of Christianity. For, in 1487, Pope Eugene IV, by virtue of the teaching power conferred on him by the Almighty, and under the divine guarantee

* See De Angelis, “*Lectiones Meteorol.*,” 75.

† For a very interesting statement of Agobard’s position and work, with citations from his “*Liber contra insulsam vulgi opinionem de grandine et tonitruis*,” see Poole, “*Illustrations of the History of Mediæval Thought*,” 40, *et seq.* The works of Agobard may be found in vol. civ of Migne’s “*Patrol. Lat.*”

against any possible error, issued a bull exhorting the inquisitors of heresy and witchcraft to use greater diligence against the human agents of the Prince of Darkness, and especially against those who have the power to produce bad weather. In 1445 Pope Eugene returned again to the charge, and again issued instructions and commands infallibly committing the Church to the doctrine.* But a greater than Eugene followed and stamped the idea yet more deeply into the mind of the Church. On the 7th of December, 1484, Pope Innocent VIII sent forth his bull "*Summis Desiderantes*." Of all documents ever issued from Rome, imperial or papal, this has doubtless, first and last, cost the greatest shedding of innocent blood. Yet no document was ever more clearly dictated by conscience. (Inspired by the scriptural command, "Thou shalt not suffer a witch to live," Pope Innocent exhorted the clergy of Germany to leave no means untried to detect sorcerers, and especially those who by evil weather destroy vineyards, gardens, meadows, and growing crops.† These precepts were based upon various texts of Scripture, especially upon the famous statement in the book of Job; and, to carry them out, witch-finding inquisitors were authorized by the Pope to scour Europe, especially Germany, and a manual was prepared for their use, the "Witch-Hammer," *Malleus Maleficarum*. In this manual, which was revered for centuries, both in Catholic and Protestant countries, as almost divinely inspired, the doctrine of Satanic agency in atmospheric phenomena was further developed, and various means of detecting and punishing it were dwelt upon.‡

With the application of torture to thousands of women, in accordance with the precepts laid down in this work, it was not difficult to extract masses of proof for this "sacred theory" of meteorology. The poor creatures, writhing on the rack, held in horror by those who had been nearest and dearest to them, anxious only for death to relieve their sufferings, confessed to anything and everything that would satisfy the inquisitors and judges. All that was needed was that the inquisitors should ask leading questions * and suggest satisfactory answers: the prisoners, to shorten the torture, were sure sooner or later to give the answer required, even though they knew that this would

* See Reynaldus, "Annales Eccl.," 1437, 1445.

† The Latin text of the bull may be found in the *Malleus* about to be described, in Binsfeld's "De Confessionibus," cited below, or in Roskoff's "Geschichte des Teufels" (Leipzig, 1869), i, 222-225.

‡ There is, so far as I know, no good analysis, in any English book, of the contents of the "Witch-Hammer"; but such may be found in Roskoff's "Geschichte des Teufels," or in Soldan's "Geschichte der Hexenprozesse." Its first dated edition is that of 1489. It was, happily, never translated into any modern tongue.

* For still extant lists of such questions, see the "Zeitschrift für deutschen Culturgeschichte" for 1858, pp. 522-528, or Diefenbach, "Der Hexenwahn in Deutschland," pp. 15-17. Father Vincent of Berg (in his "Enchiridium") gives a similar list for use by priests in the confession of the accused.

send them to the stake or scaffold. Under the doctrine of "excepted cases," there was no limit to torture for persons accused of heresy or witchcraft; (even the safeguards which the old pagan world had imposed upon torture were thus thrown down,) and the prisoner *must* confess.

The theological literature of the middle ages was thus enriched with numberless statements regarding modes of Satanic influence on the weather. Pathetic, indeed, are the records; and none more so than the confessions of these poor creatures, chiefly women and children, during hundreds of years, as to their manner of raising hailstorms and tempests. Such confessions, by tens of thousands, are still to be found in the judicial records of Germany, and indeed of all Europe. Typical among these "facts" thus revealed is one on which great stress was laid during ages, and for which the world was first indebted to one of these poor women. Crazed by the agony of torture, she declared that, returning with a demon through the air from the witches' sabbath, she was dropped upon the earth in the confusion which resulted among the hellish legions when they heard the bells sounding the *Ave Maria*. It is sad to note that, after a confession so valuable to sacred science, the poor woman was condemned to the flames. This revelation speedily ripened the belief that, whatever might be going on at the witches' sabbath—no matter how triumphant Satan might be—at the moment of sounding the consecrated bells the Satanic power was paralyzed. This theory once started, proofs came in to support it, during a hundred years, from the torture-chambers in all parts of Europe. Throughout the later middle ages the Dominicans had been the main agents in extorting and promulgating these revelations, but in the centuries following the Reformation the Jesuits devoted themselves with even more keenness and vigor to the same task.* Some curious questions incidentally arose. It was mooted among the orthodox authorities whether the damage done by storms should or should not be assessed upon the property of convicted witches. The theologians inclined decidedly to the affirmative; the jurists, on the whole, to the negative.

But, in spite of these tortures, lightning and tempests continued, and great men arose in the Church throughout Europe in every generation to point out new cruelties for the discovery of "weather-makers," and new methods for bringing their machinations to naught. Here and there, indeed, a thinker endeavored to modify or oppose this view. Early in the sixteenth century Paracelsus called attention to the reverberation of cannon as explaining the rolling of thunder,† but he was confronted by one of the greatest men of his time. Jean Bodin, as superstitious in natural as he was rational in political science, made

* For proofs of this, see not only the histories of witchcraft, but also the "*Annus litterarum*" of the Jesuits themselves, *passim*.

† See the citation from him in Fromond's "*Meteorologica*," lib. iii, c. 9.

sport of the scientific theory, and declared thunder to be "a flaming exhalation set in motion by evil spirits, and hurled downward with a great crash and a horrible smell of sulphur."* In support of this view, he dwells upon the confessions of tortured witches, upon the acknowledged agency of demons in the will-o'-the-wisp, and specially upon the passage in the 104th Psalm, "Who maketh his angels spirits, his ministers a flaming fire."† To resist such powerful arguments by such powerful men was dangerous indeed. In 1513, Pomponatius, professor at Padua, published a volume of "Doubts as to the Fourth Book of Aristotle's *Meteorologica*,"‡ and also dared to question this power of devils; but he soon found it advisable to explain that, while as a *philosopher* he might doubt, yet as a *Christian* he of course believed everything taught by Mother Church—devils and all—and so escaped the fate of several others who dared to question the agency of witches in atmospheric and other disturbances. Before the end of the sixteenth century, Cornelius Loos, professor in the University of Treves, daring to express similar doubts, was seized by the Inquisition, forced to recant, and banished. Just a century later the Protestant divine, Balthasar Bekker, in Holland, who ventured not only to question the devil's power over the weather, but to deny his bodily existence altogether, was solemnly tried by the synod of his church, and expelled from his pulpit, while his views were condemned as heresy, and overwhelmed with a flood of refutations whose mere catalogue would fill pages; and these cases were but typical of many.

The great upholders of the orthodox view retained full possession of the field. Famous among these was Bishop Binsfeld, of Treves, who, toward the end of the sixteenth century, wrote a book to prove that everything confessed by the witches under torture, especially the raising of storms and the general controlling of the weather, was worthy of belief; and this book became throughout Europe a standard authority, both among Catholics and Protestants.* Even more inflexible was Remigius, criminal judge in Lorraine. On the title-page of his manual|| he boasts that within fifteen years he had sent nine hundred persons to death for this imaginary crime.

Protestantism fell into the superstition as fully as Catholicism. In

* He adds: "Id certissimam dæmonis præsentiam significat: nam ubicunque dæmones cum hominibus nefaria societatis fide copulantur, foedissimum semper relinquunt sulphuris odorem, quod sortilegi sæpissime experiuntur et confitentur."

† See Bodin's "*Universæ Naturæ Theatrum*" (Frankfort, 1597), pp. 208–211.

‡ The first edition of this book, which was the earliest of Pomponatius's writings, is excessively rare; but it was reprinted at Venice just a half-century later. It is in his *De incantationibus*, however, that he speaks especially of devils. As to Pomponatius, see Creighton's "History of the Papacy during the Reformation," and an excellent essay in Franck's "*Moralistes et Philosophes*."

* It bore the title of "*Tractatus de confessionibus maleficorum et sagarum*." First published at Treves in 1589, it appeared subsequently four times in the original Latin, as well as in two distinct German translations, and in a French one.

|| "*Dæmonolatreia*," first printed at Lyons in 1595.

Germany, during the century following the Reformation, the great Saxon jurist, Benedict Carpzov, distinguished himself by his skill in demonstrating the reality of the crime from Scripture, and by his cruelty in detecting and punishing it by torture.

Typical as to the attitude of Scotch and English Protestants, was the theory and practice of King James I, "the crowned Solomon," himself the author of a book on demonology. James had married the Princess of Denmark, and the ship which bore her to the British shores encountered tempests. Skillful use of unlimited torture soon brought the causes to light. A Doctor Fian, while his legs were crushed in the "boots" and wedges driven under his finger-nails, confessed that several hundred witches had gone to sea in a sieve from the port of Leith, and had raised storms and tempests to drive back the king's bride.* Still later, in the second half of the seventeenth century, we see a typical example of the same superstition in England in the case of Meric Casaubon, Doctor of Divinity and an ecclesiastic in high position at Canterbury. He declared fully for the doctrine that witches raise storms, citing the foremost ecclesiastical authorities.†

In America, the great weight of the elder Mather was thrown on the same side.‡ But, in spite of all these great authorities, in every land, and in spite of such summary punishments as those of Loos and Bekker, scientific thought was developed; and, at the end of the seventeenth century, this vast growth of superstition began to wither and droop. Bayle in France, Calef in New England, and Thomasius in Germany, did much to create an intellectual and moral atmosphere fatal to it. Torture being abolished, "weather-makers" no longer confessed; and the fundamental proofs in which the system was rooted were evidently slipping away. Even the great theologian

* The best accounts of James's share in the extortion of these confessions may be found in the collection of "Curious Tracts" published at Edinburgh in 1820. (See also King James's own "Demonologie," and Pitcairn's "Criminal Trials of Scotland," vol. i, part ii, pp. 213-223.)

† See his "Credulity and Incredulity in Things Natural," pp. 66, 67.

‡ Thus, in his sermons (already cited) on "The Voice of God in Stormy Winds" (Boston, 1704), he says: "When there are great Tempests, the Angels oftentimes have an hand therein. . . . Yea, and sometimes, by Divine Permission, Evil Angels have a Hand in such Storms and Tempests as are very hurtful to Men on the Earth." Yet, "for the most part, such Storms are sent by the Providence of God as a Sign of His Displeasure for the Sins of Men," and sometimes "as Prognosticks and terrible Warnings of Great Judgments not far off." And thus from the height of his erudition he rebukes the timid voice of scientific skepticism: "There are some who would be esteemed the Wits of the World, that ridicule those as Superstitious and Weak Persons, which look upon Dreadful Tempests as Prodromous [*sic*] of other Judgments. Nevertheless, the most Learned and Judicious Writers, not only of the Gentiles, but amongst Christians, have Embraced such a Persuasion; their Sentiments therein being Confirmed by the Experience of many Ages." For another curious turn given to this theory, with reference to sanitary science, see Deodat Lawson's famous sermon at Salem, in 1692, on "Christ's Fidelity a Shield against Satan's Malignity" (p. 21 of the second edition).

Fromundus, at the University of Louvain, the oracle of his age, who had demonstrated the futility of the Copernican theory, now tends toward the inevitable attempt at compromise, and declares that devils, though *often*, are not *always*, or even "for the most part," the causes of thunder.* And the learned Jesuit, Caspar Schott, whose "*Physica Curiosa*" was one of the most popular books of the seventeenth century, ventures only the same mild statement.† But even such a concession by so great champions of orthodoxy did not prevent frantic efforts in various quarters to bring the world back under the old dogma, and, as late as 1743, we find a manual by Father Vincent of Berg,‡ in which the superstition is taught to its fullest extent, issued for the use of priests, under the express sanction of the theological professors of the University of Cologne.

It was hardly out of press, when there came a death-blow to the whole theory. In 1752 Franklin made his experiments with the kite on the banks of the Schuylkill; and, at the moment when he drew the electric spark from the cloud, the whole tremendous fabric of theological meteorology reared by the Fathers, the Popes, the mediæval Doctors, and the long line of great theologians, Catholic and Protestant, collapsed; the "Prince of the power of the air" tumbled from his seat; the great doctrine which had so long afflicted the earth was prostrated forever.

The experiment of Franklin was repeated in various parts of Europe, but, at first, the Church seemed careful to take no notice of it. The old church formulas against the powers of the air were still used, but the theological theory, especially in the Protestant Church, began to grow milder. Four years after Franklin's discovery Pastor Karl Koken, member of the Consistory and official preacher to the City Council of Hildesheim, was moved by a great hailstorm to preach and publish a sermon on "The Revelation of God in Weather."* Of "the Prince of the power of the air" he says nothing—the whole theory of diabolical agency is thrown overboard altogether; his whole attempt is to save the older and more harmless theory, that the storm is the voice of God. He insists that, since Christ told Nicodemus that men "know not whence the wind cometh," it can not be of mere natural origin, but is sent directly by God himself, as David intimates in the Psalm, "out of His secret places." As to the hailstorm, he lays great stress upon the plague of hail sent by the Almighty upon Egypt, and

* See Fromundus's "*Meteorologica*" (London, 1656) lib. iii, c. 9, and lib. ii, c. 3.

† See Schott's "*Physica Curiosa*" (edition of Würzburg, 1667), p. 1249.

‡ His "*Enchiridium quadripartitum*" (Cologne, 1743). Besides benedictions and exorcisms for all emergencies, it contains full directions for the manufacture of the *Agnus Dei*, and of another sacred panacea called "Heiligthum," not less effective against evil powers, gives formulæ to be worn for protection against the devil, suggests a list of signs by which diabolical possession may be infallibly recognized, and prescribes the questions to be asked by priests in the examination of witches.

* "Die Offenbarung Gottes in Wetter" (Hildesheim, 1756).

clinches all by insisting that God showed at Mount Sinai his purpose to startle the body before impressing the conscience.

While the theory of diabolical agency in storms was thus drooping and dying, very shrewd efforts were made at compromise, such as we always see in the history of every science when its victory is fully in sight. The first of these attempts we have already noted in the effort to explain the efficacy of bells in storms by their simple use in stirring the faithful to prayer, and in the concession made by sundry theologians, and even by the great Lord Bacon himself, that church-bells might, under the sanction of Providence, disperse storms by agitating the air. This gained ground somewhat, though it was resisted by one eminent church authority, who answered shrewdly that, in that case, cannon would be even more pious instruments.* Still another argument used in trying to save this part of the theological theory was that the bells were consecrated instruments for this purpose, "like the horns at whose blowing the walls of Jericho fell."

But these compromises were of little avail. In 1766 Father Sterzinger attacked the very groundwork of the whole diabolic theory. He was, of course, bitterly assailed, insulted, and hated; but the Church thought it best not to condemn him. More and more, the "Prince of the power of the air" retreated before the lightning-rod of Franklin. The older Church, while clinging to the old theory theoretically, was finally obliged to confess the supremacy of Franklin's theory practically; for his lightning-rod did what exorcisms, and holy water, and processions, and the *Agnus Dei*, and the ringing of church-bells, and the rack, and the burning of witches, had failed to do. This was clearly seen, even by the poorest peasants in Eastern France, when they observed that the grand spire of Strasburg Cathedral, which neither the sacredness of the place, nor the bells within it, nor the holy water and relics beneath it, could protect from frequent injuries by lightning, was once and for all protected by Franklin's rod. Then came into the minds of multitudes the answer to the question which had exercised for ages the leading theological minds of Europe, namely, "Why should the Almighty strike his own consecrated temples, or suffer Satan to strike them?"

Yet even this practical solution of the great question was not received without opposition. The first lightning-conductor upon a church in England was not put up until 1762, ten years after Franklin's discovery. The spire of Saint Bride's Church in London was greatly injured by lightning in 1750, and in 1764 a storm so wrecked its masonry that it had to be mainly rebuilt; yet for years after this the authorities refused to attach a lightning-rod!† The Protestant Cathedral of Saint Paul's in London was not protected until sixteen years after Franklin's discovery, and the tower of the great Protestant church at Hamburg

* See Gretser's "De benedictionibus," lib. ii, c. 46.

† See Priestley, "History of Electricity," p. 407.

not until a year later still. As late as 1783 it was declared in Germany, on excellent authority, that within a space of thirty-three years nearly four hundred towers had been damaged, and one hundred and twenty bell-ringers killed.

In Roman Catholic countries a similar prejudice was shown, and its cost at times was heavy. In Austria the church of Rosenberg, in the mountains of Carinthia, was struck so frequently, and with such loss of life, that the peasants feared at last to attend service. Three times was the spire rebuilt, and it was not until 1778—twenty-six years after Franklin's discovery—that the authorities permitted a rod to be attached. Then all trouble ceased.

Typical in Italy was the tower of Saint Mark's at Venice. In spite of the angel at its summit and the bells consecrated to ward off the powers of the air, and the relics in the cathedral hard by, and the processions in the adjacent piazza, the tower was frequently injured and even ruined by lightning. In 1388 it was badly shattered; in 1417, and again in 1489, the wooden spire surmounting it was utterly consumed; it was again greatly injured in 1548, 1565, 1653, and in 1745 was struck so powerfully that the whole tower, which had been rebuilt of stone and brick, was shattered in thirty-seven places. Although the invention of Franklin had been introduced into Italy by the physicist Beccaria, the tower of Saint Mark's still went unprotected, and was again badly struck in 1761 and 1762; and not until 1766—fourteen years after Franklin's discovery—was a lightning-rod placed upon it: and it has never been struck since.

So, too, though the beautiful tower of the Cathedral of Siena, protected by all possible theological means, had been struck again and again, much opposition was shown to placing upon it what was generally known as "the heretical rod"; but the tower was at last protected by Franklin's invention, and in 1777, though a very heavy bolt passed down the rod, the church received not the slightest injury. This served to reconcile theology and science, so far as that city was concerned; but the case which did most to convert the Italian theologians to the scientific view was that of the church of Saint-Nazaire at Brescia. The Republic of Venice had stored in the vaults of this church over two hundred thousand pounds of powder. In 1767—seventeen years after Franklin's discovery—no rod having been placed upon it, it was struck by lightning, the powder in the vaults was exploded, one sixth of the entire city destroyed, and over three thousand lives lost.*

Such examples as these, in all parts of Europe, had their effect. The formulas for conjuring off storms, and for consecrating bells to ward off lightning and tempests, and for putting to flight the powers of the air, were still allowed to stand in the liturgies; but the lightning-rod, the barometer, and the thermometer, carried the day.

* See article on "Lightning" in the "Edinburgh Review" for October, 1844.

A noble line of investigators succeeding Franklin completed his victory. The traveler in remote districts of Europe still hears the church-bells ringing during tempests ; the Polish or Italian peasant is still persuaded to pay fees for sounding bells to keep off hailstorms ; but the universal tendency favors more and more the use of the lightning-rod, and of the insurance-offices where men can be relieved of the ruinous results of meteorological disturbances in accordance with the scientific laws of average, based upon the ascertained recurrence of storms. So, too, though many a poor seaman trusts to his charm that has been bathed in holy water, or that has touched some relic, the tendency among mariners is to value more and more those warnings which are sent far and wide each day over the earth and under the sea by the electric wires in accordance with laws ascertained by observation.

Yet, even in our own time, attempts to revive the old theological doctrine of meteorology have not been wanting. Two of these, one in a Roman Catholic and another in a Protestant country, will serve as types of many, to show how completely scientific truth has saturated and permeated minds supposed to be entirely surrendered to the theological view.

The Island of Saint Honorat, just off the southern coast of France, is deservedly one of the places most venerated in Christendom. The monastery of Lérins, founded there in the fourth century, became a mother of similar institutions in Western Europe, and a center of religious teaching for the Christian world. In its atmosphere, legends and myths grew in beauty and luxuriance. Here, as the chroniclers tell us, at the touch of Saint Honorat, burst forth a stream of living water, which a recent historian of the monastery declares a greater miracle than that of Moses ; here he destroyed, with a touch of his staff, the reptiles which infested the island, and then forced the sea to wash away their foul remains. Here, to please his sister, Sainte-Marguerite, a cherry-tree burst into full bloom every month ; here he threw his cloak upon the waters and it became a raft, which bore him safely to visit the neighboring island ; here, Saint Patrick received from Saint Just the staff with which he imitated Saint Honorat by driving all reptiles from Ireland.

Pillaged by Saracens and pirates, the island was made all the more precious by the blood of Christian martyrs. Popes and kings made pilgrimages to it ; saints, confessors, and bishops went forth from it into all Europe ; in one of its cells, Saint Vincent of Lérins wrote that famous definition of pure religion which, for nearly fifteen hundred years, has virtually superseded that of Saint James. Naturally, the monastery became most illustrious, and its seat "the Mediterranean Isle of Saints."

But, toward the close of the last century, its inmates having become slothful and corrupt, it was dismantled, all save a small portion torn



down, and the island became the property, first of impiety, embodied in a French actress, and finally of heresy, embodied in an English clergyman.

Bought back for the Church by the Bishop of Fréjus in 1869, there was little revival of life for twelve years. Then came the reaction, religious and political, after the humiliation of France and the Vatican by Germany ; and of this reaction the monastery of Saint Honorat was made one of the most striking outward and visible signs. Pius IX interested himself directly in it, called into it a body of Cistercian monks, and it became the chief seat of their order in France. To restore its sacredness the strict system of La Trappe was established—labor, silence, meditation on death. The word thus given from Rome was seconded in France by cardinals, archbishops, and all churchmen especially anxious for promotion in this world or salvation in the next. Worn-out dukes and duchesses of the Faubourg Saint-Germain united in this enterprise of pious reaction with the frivolous youngsters, the *petits crevés*, who haunt the purlieus of Notre Dame de Lorette. The great church of the monastery was handsomely rebuilt and a multitude of altars erected ; and beautiful frescoes and stained windows came from the leaders of the reaction. The whole effect was, perhaps, somewhat too theatrical and thin, but it showed none the less earnestness in making the old “Isle of Saints” a protest against the hated modern world.

As if to bid defiance still further to modern liberalism, great store of relics was sent in—among these, pieces of the true cross, of the white and purple robes, of the crown of thorns, sponge, lance, and winding-sheet of Christ—the hair, robe, veil, and girdle of the Blessed Virgin—relics of Saint John the Baptist, Saint Joseph, Saint Mary Magdalene, Saint Paul, Saint Barnabas, the four Evangelists, and a multitude of other saints ; so many that the bare mention of these treasures requires twenty-four distinct heads in the official catalogue recently published at the monastery. Besides all this—what was considered even more powerful in warding off harm from the revived monastery—the bodies of Christian martyrs were brought from the Roman catacombs and laid beneath the altars.*

All was thus conformed to the mediæval view ; nothing was to be left which could remind one of the nineteenth century ; the “ages of faith” were to be restored in their simplicity. Pope Leo XIII commended to the brethren the writings of Saint Thomas Aquinas, as their one great object of study ; and works published at the monastery dwelt upon the miracles of Saint Honorat as the most precious refutation of modern science.

High in the cupola, above the altars and relics, were placed the bells. Sent by pious donors, they were solemnly baptized and con-

* See the “Guide des Visiteurs à Lérins,” published at the monastery in 1880, p. 204 ; also the “Histoire de Lérins,” mentioned below.

secrated in 1871, four bishops officiating, a multitude of the faithful being present from all parts of Europe, and the sponsors of the great tenor bell being the Bourbon claimant to the ducal throne of Parma and his duchess. The good bishop who baptized the bells consecrated them with a formula announcing their efficacy in driving away the "Prince of the power of the air," and the lightning and tempests he provokes.

And then, above all, at the summit of the central spire, high above relics, altars, and bells, was placed—*a lightning-rod!**

The account of the monastery, published under the direction of the present worthy abbot, more than hints at the saving, by its bells, of a ship which was wrecked a few years since on that coast; and yet, to protect the bells and church and monks and relics from the very foe whom, in the mediæval faith, all these were thought most powerful to drive away, recourse was had to the scientific discovery of that "arch-infidel," Benjamin Franklin!

Perhaps the most striking recent example in Protestant lands of this change from the old to the new, occurred not long since in one of the great Pacific dependencies of the British crown. At a time of severe drought, an appeal was made to the bishop, Dr. Moorhouse, to order public prayers for rain. The bishop refused, advising the petitioners for the future to take better care of their water-supply, virtually telling them, "Heaven helps those who help themselves." But most noteworthy in this matter was it that the English Government, not long after, scanning the horizon to find some man to take up the good work laid down by the lamented Bishop Fraser, of Manchester, chose Dr. Moorhouse; and his utterance upon meteorology, which a few generations since would have been regarded by the whole Church as blasphemy, was universally alluded to as an example of strong good sense, proving him especially fit for one of the most important bishoprics in England.

Throughout Christendom, the prevalence of the conviction that meteorology is obedient to laws, is more and more evident. In cities especially, where men are accustomed each day to see posted in public places charts which show the storms moving over various parts of the country, and to read in the morning papers scientific prophecies as to the weather, the old view can hardly be very influential.

Significant of this was the feeling of the American people during the fearful droughts a few years since in the States west of the Mis-

* See "Guide," as above, p. 84. "Les Isles de Lérins," by the Abbé Alliez (Paris, 1860), and the "Histoire de Lérins," by the same author, are the authorities for the general history of the abbey, and are especially strong in presenting the miracles of Saint Honorat, etc. The "Cartulaire" of the monastery, recently published, is also valuable. But these do not cover the recent revival, for an account of which recourse must be had to the very interesting and naïve "Guide" already cited.

souri. No days were appointed for fasting and prayer to bring rain—there was no attribution of the calamity to the wrath of God or the malice of Satan ; but much was said regarding the folly of our people in allowing the upper regions of their vast rivers to be denuded of forests, thus subjecting the States below to alternations of drought and deluge. Partly as a result of this, a beginning has been made of teaching forest-culture in many schools, tree-planting societies have been formed, and “Arbor-day” is recognized in several of the States. A true and noble theology can hardly fail to recognize, in the love of Nature and care for our fellow-men thus promoted, something far better, both from a religious and a moral point of view, than any efforts to propitiate the Divine anger by flattery, or to avert Satanic malice by fetichism.

2. The second section focuses on the role of communication in achieving organizational goals. It highlights the importance of clear and concise communication, both internally and externally. The text provides examples of effective communication strategies, such as regular team meetings, open-door policies, and the use of various communication channels like email, phone, and face-to-face interactions. It also discusses the importance of listening and understanding the needs and concerns of all stakeholders.

3. The third part of the document addresses the challenges of managing a large and diverse workforce. It discusses the importance of providing training and development opportunities to ensure that employees have the skills and knowledge needed to perform their jobs effectively. The text also mentions the need for a strong organizational culture that promotes collaboration, innovation, and a sense of purpose. Additionally, it discusses the importance of maintaining a safe and healthy work environment for all employees.

4. The final section of the document discusses the importance of financial management and budgeting. It outlines the steps involved in creating a budget, including identifying goals, estimating costs, and allocating resources. The text also mentions the importance of monitoring and controlling expenses to ensure that the organization stays within its budget. It concludes by emphasizing the importance of financial transparency and accountability to all stakeholders.

